

ZOOGOER

January-February 1986



Ling-Ling and Hsing-Hsing, p. 4

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Cover Photos

Front cover: Hsing-Hsing peers at his mate Ling-Ling during an early morning encounter (story, page 4; photo by Jessie Cohen, NZP Graphics). *Back cover*: The Zoo's polar bears dry out after one of their frequent swims (story, page 9; photo courtesy of NZP Office of Graphics and Exhibits).

A NEW YEAR TOAST

Dear FONZ Member,

As we start a new year at the National Zoo, it is appropriate to recognize how much any Zoo depends on the skill and dedication of its keepers, curators, and veterinarians. We at the National Zoo are particularly fortunate in this respect. One has only to walk around the Zoo and see the sparkling condition of our animals to realize what devotion and specialized knowledge goes into their care and maintenance.

The role of our veterinarians and curators in animal care is vital and often conspicuous. However, it is important to realize that everything ultimately depends on the professionalism and efficiency of our keepers, who are frequently unheralded and unsung. [See "Keeping Up with Keepers," p. 19.] I would like to correct this anomaly, and—figuratively at least—call for you all to raise your glasses and join me in a New Year's toast "to the keepers of the National Zoo and the zoos of the world; what would we do without them?"

A good keeper has a special combination of qualities in which education, training, and experience are leavened with sensitivity. A parallel to the master gardener's "green thumb" occurs in people who work with animals: Someone who is finely attuned to the behavior, appearance, sound, and smell of an animal can recognize its mood, the state of its health and needs.

Good research biologists often have the same highly trained perceptions, and the similarity does not end there. Our keepers make important discoveries in animal husbandry and publish them. I think it is vital that the knowledge they acquire should be available for generations to come. We need more and more permanent records from our skilled staff. The future of life on earth will become increasingly dependent on the work of zoos. This means that keepers will become even more crucial.

Sincerely,

Dr. Michael Robinson, Director
National Zoological Park



Virginia Garber

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Jessie Cohen, NZP Graphics

Crowned cranes

NEW AT THE ZOO

Two juvenile gorillas—Mandara, a three-year-old female, and Kuja, a two-year-old male—are giving Zoo visitors a rare opportunity to see young gorillas play and explore their environment in the Great Ape House. The pair has been loaned to NZP by the Milwaukee Zoo.

The National Zoo's ornithology staff is celebrating its first successful hatching of crowned cranes in 14 years. The parents are a female hatched at NZP in 1971 and a male imported from East Africa in 1978. The staff has tried to encourage reproduction in the pair since the arrival of the male, so the hatching of three downy chicks last September was a long-awaited reward.

New at the Reptile House are a king cobra given to NZP by the Bronx Zoo and recently hatched day geckos, rainbow boas, Sinaloan milksnakes, and a Chinese water dragon. Other Zoo newborns include an acouchi, titi monkey, and two house shrews in the Small Mammal House; two white-cheeked gibbons, a Siamang gibbon, and a lion-tailed macaque in the Monkey House; a sunbittern and common hoopoe in the Bird House; and a Reeve's muntjac in the Hoofed Stock area.

ANIMAL EXTINCTIONS

It is likely that more than two thirds of all animal species that have ever existed are now extinct. While the fossil record seems to show that extinction of species is the norm, today most extinctions can be attributed solely to human encroachment, specifically the destruction of habitat.

In *Animal Extinctions: What Everyone Should Know*, distinguished scientists discuss the enormous problems society faces in determining which species will survive and which will not. They examine some imaginative ways to combat species extinctions and the destruction of habitat.

A book of essays collected from the National Zoo's first award-winning Public Symposium, *Animal Extinctions* is now available at the Bookstore Gallery in the Zoo's Education Building.

HANDREARING VOLUNTEERS

The Zoo's Handrearing Facility needs weekday volunteers to help take care of infant Zoo animals. Volunteers should be able to work a minimum of four weekdays a month, 7 a.m. to 6 p.m. For more information, call Jo Anne Grumm, 673-4956.

Jessie Cohen, NZP Graphics



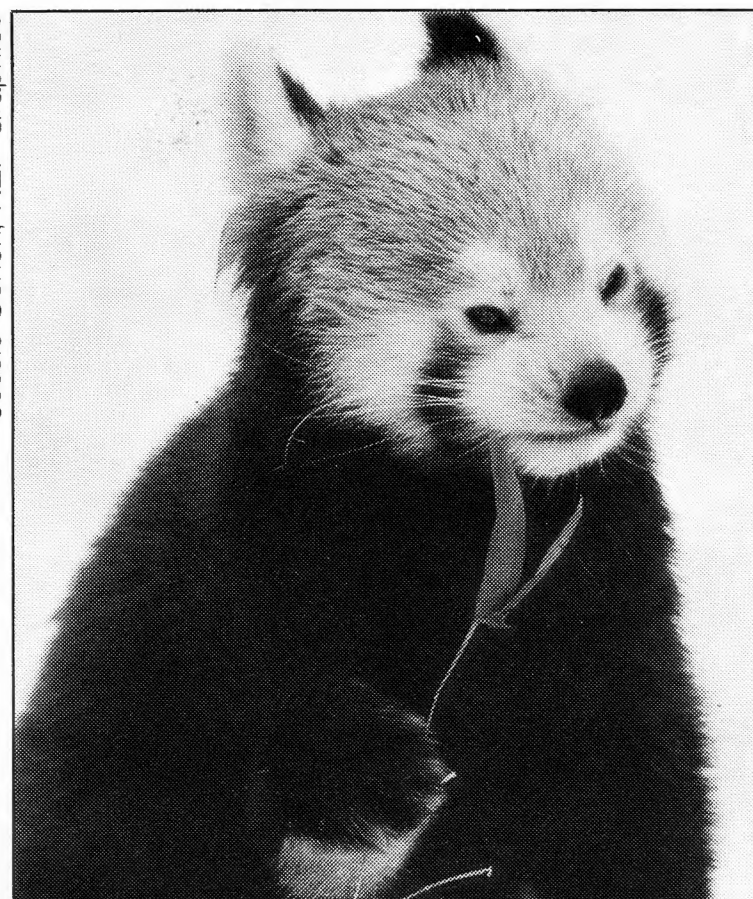
Hand-reared tiger

JOBS AT THE ZOO

FONZ needs dependable, enthusiastic employees for all of its visitor services staffs (gift shop, parking, and stroller rental cashiers; food preparation, service, and sales; traffic and information aides; and grounds clean-up crew) during the Zoo's busy seasons—spring, summer, and early fall.

If you, family members, or friends (age 16 and over) have four or five days free each week and would like to work for FONZ at the National Zoo during some or all of these seasons, please call FONZ Human Resources, 673-4970, weekdays 9 to 4 soon, and request a seasonal jobs brochure and application.

Jessie Cohen, NZP Graphics



Bamboo-eating carnivore

LETTERS

Dear ZooGoer,

Your article "The Other Panda" calls the red panda a carnivore but implies that its principal food is bamboo. Please explain.

H. C. Riggs
Falls Church, Va.

According to the Zoo's red panda expert Miles Roberts, "The red panda is classified in the mammalian order Carnivora on the basis of its anatomical similarities to other carnivores. Secondly, it has adopted a mostly vegetarian diet, including bamboo. Its diet probably also includes a small amount of animal matter, though much less than the diets of other members of the order."

Dear ZooGoer,

I couldn't pass up sending you this photo I took at the June 21, 1985, ZooNight. I have no idea who the little girl is, but I think she is precious!

G. T. Prosser
Woodbridge, Va.



ZooNight "tiger"

1985 Panda Watch

Susan Weinberg

Photos by Jessie Cohen, NZP Graphics

While popular wisdom has it that one cannot be "a little bit pregnant," the National Zoo's female giant panda seems to prove the exception to the rule. Strong indications that Ling-Ling was pregnant and would deliver in late fall had raised the hopes of panda fans, but 1985 slipped into 1986 without a panda birth.

What happened? A hard and fast answer may never be found, but NZP scientists suggest either that Ling-Ling was pregnant and absorbed the developing fetus, or that she had a false pregnancy, in which symptoms appear but later vanish without a birth. Such pseudo-pregnancies occur in several groups of mammals and may account for a similar false alarm that followed the artificial insemination of Ling-Ling in 1982.

Zoo officials hope to press on with the breeding effort for several years to come. Re-tracing the events of 1985 and previous years may offer one key to eventual success.

February 1985

Morning encounters began for the normally solitary giant pandas. Tumbling and wrestling in their outdoor yard, Ling-Ling and Hsing-Hsing renewed their acquaintance as the spring breeding season approached. Females are at the peak of estrus and receptive to mating only two to four days each year, so establishing compatibility is a vital phase

of the difficult captive breeding process.

March

Specially trained observers watched Ling-Ling for signs of estrus, such as "chirping," walking backwards, and increased scent marking, but the panda failed to exhibit her normal spring heat cycle.

June 12

Zoo veterinarians examined Ling-Ling and found her to be in good health. Using a special optical instrument called a laparoscope, the medical team was able to scan the panda's reproductive tract. All appeared to be in working order, so, with hopes of stimulating estrus, a five-day treatment with follicle stimulating hormone, sometimes used to encourage ovulation in women and female animals, was initiated.

June 21

Hsing-Hsing, the male panda, began mounting Ling-Ling during their encounters.

June 23

Ling-Ling began to show signs of a strong heat cycle, vocalizing repeatedly and displaying great interest in her mate, Hsing-Hsing.

June 30-July 2

Mating took place at 5:45 a.m. on June 30, following nine days of unproductive attempts. The pandas mated twice on the morning of July 1 and again on the morning of July 2. Back-up plans to artificially inseminate Ling-Ling were fortunately unnecessary; pre-

vious experience with pandas and domestic animals suggests that chances of conception are greater with natural mating.

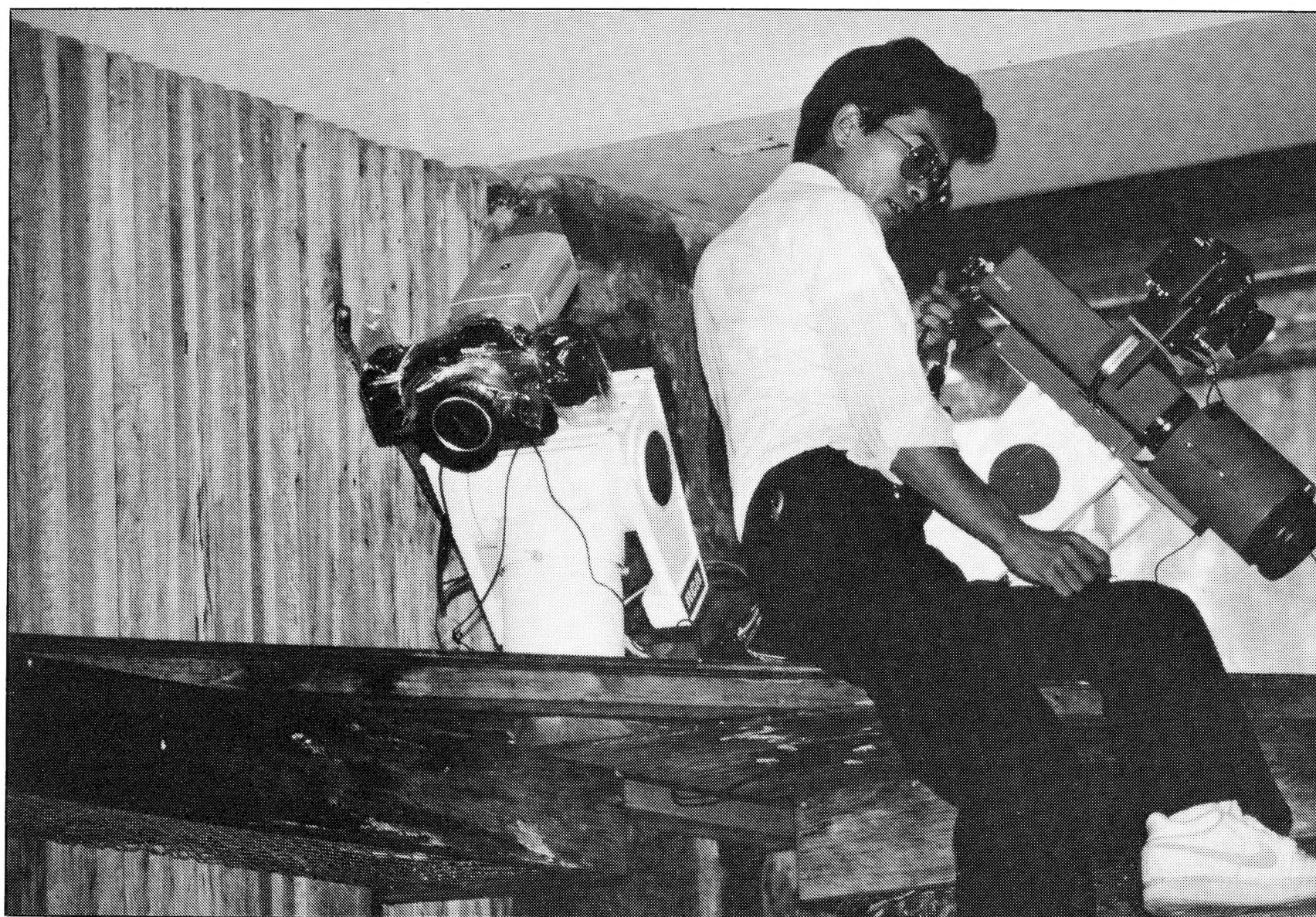
July-October

Scientists monitored Ling for changes in hormone levels and behavior. Detecting panda pregnancy is difficult, as the female remains at a stable weight and shows no external signs. Despite her large adult size, she bears a four-ounce infant small enough to fit in the palm of a human hand.

To complicate matters further, delayed implantation of the fertilized egg in the uterus means that the panda's gestation period ranges anywhere from three to five and a half months. While this characteristic (also common to roe deer, mink, seals, and several bear species) tests the nerves of human bystanders, it is probably key to the panda's survival in the wild. "Delayed implantation provides the animal with more flexibility," said Devra Kleiman, a zoologist involved with the panda breeding program. "It permits an animal to bypass the actual gestation period and have mating, birth, and weaning of its young at more optimal times. For example, pandas can have their young in autumn, and the offspring will be ready for

Above right: Hsing-Hsing takes a playful nip at his mate during one of their morning encounters. Right: Although she was in good health last spring, Ling-Ling showed no signs of estrus.





weaning in the spring, when food is abundant."

October 20

A decrease in appetite accompanied by a rise in estrogen levels indicated that Ling-Ling was probably pregnant.

October 30

The Panda House was closed and a round-the-clock watch began. Trained volunteers observed Ling-Ling via closed-circuit television, alert for behavioral cues that might indicate a birth was near. However, a birth could take place any time through mid-December.

The closed-circuit cameras, donated by the National Geographic Society, transmitted the observers' picture to a video monitor in the Zoo's Education/Administration Building. There information aides answered a flurry of questions from curious visitors: Hsing-Hsing could be seen outdoors, but Ling-Ling needed strict privacy, since wild pandas usually withdraw to a secluded den to give birth; yes, grown pandas may look "cute," but a newborn cub looks almost like a large baby rat—nearly naked, with a coat of fine white hair. "Where is the baby now?" many children wanted to know, while one of the panda's favorite activities drew attention from adults—"Is sleeping an indication of pregnancy?" they inquired, reasonably enough.

November

Keepers noted that the 248-

Even a potential panda pregnancy is an important media event. National Geographic technicians installed camera equipment in the Panda House (top); members of the press interviewed Elizabeth Frank, the NZP Collection Manager in charge of the Panda House (center); and reporters were quick to note that Hsing-Hsing seemed very tired after each mating (left).

pound panda's appetite continued to decline from her normal daily intake of 45 pounds of food (30 pounds of bamboo, plus carrots, apples, and a cereal mixture). Collecting urine samples for continued analysis, keepers and veterinarians also monitored urine color and fecal consistency, both effective indicators of an animal's health.

Excitement mounted among the panda watchers as the calendar pages turned. Whatever the outcome of the pregnancy, every shred of data compiled by the volunteers would increase the base of information about the rare giant panda. "Comparing Ling-Ling's present behavioral and hormonal data with the patterns of previous years has helped us predict where we are and where we're going," said Dr. Kleiman.

"We have check sheets to monitor every single, possible, imaginable activity that a panda could do, from resting and eating, to elimination, to any scratching or itching or licking she does," said Diane Wilshere, a FONZ information aide who moonlights as a volunteer panda watcher. "We note what she does, where she does it, and how long it lasts."

Familiarity with Ling-Ling's habits and temperament would alert observers to the early stages of labor and birth. "If you've ever watched her, you know that when she rests, she's just flat out," said Jo Anne Grumm, the FONZ program assistant who coordinates and trains the 75 volunteer watchers. "But if you see that she's kind of antsy—you know that isn't her, there's something the matter."

Panda keeper Marcia Clevenger collects urine samples to be tested for hormone levels (right), and puts an antibiotic pill in a sweet potato that will be fed to Ling-Ling (above).



General restlessness aside, observers looked for other, more concrete signs of impending birth, such as nest-building with bamboo, unusual vocalizations, excessive anogenital grooming, seepage of amniotic fluid, and actual contractions. In fact, Ling-Ling seems to have developed her own unique tip-off: Before the birth of the first two cubs, she grated carrots with her claws and rubbed the shreds over her face and body.

Once alerted, or even merely suspicious, volunteers were instructed to videotape all the animal's activities and notify the Zoo staffer on call to size up the situation and determine the steps to be taken. With the advent of labor, the volunteer would start recording information on the "birth sheet," a minute-by-minute rundown of the panda's activities. Despite a few false alarms (like mistaking hiccups for contractions), the system has run through three birth seasons with clockwork precision.

November 15

Analysis of Ling-Ling's urine

indicated a possible genital/urinary infection, and daily treatment with an antibiotic was begun. The medication was necessary to protect not only Ling-Ling, who is prone to such infections, but, if she were pregnant, the growing fetus as well.

November 29

Time was running out for Ling-Ling to deliver, and hopes were beginning to fade. Perhaps she had absorbed the developing fetus or was exhibiting symptoms of false pregnancy, as she had in 1982.

November 30

Ling-Ling began to cuddle and cradle apples, an apparent imitation of maternal behavior that caused great excitement among the discouraged watchers. (Most of the year, Ling pays no special attention to apples, but she picked up and cradled apples five days before, and for several weeks following, the stillbirth of 1984.) Over the next weeks, she was often seen carrying two or three apples in her paws, tucking them in her armpit or under her chin, or nestling them in the crook of

her arm, as she would a cub. "I just hope that when she has the baby, she puts down the apples and picks up the baby!" said volunteer coordinator Grumm.

The panda also began to lick her genital area for extended periods of time that morning and continued to groom herself frequently thereafter.

December 2

Ling-Ling built a bamboo nest in her den.

December 17

Ling-Ling reached the 168th day—the longest recorded panda gestation—since mating. Zoo scientists re-evaluated the evidence and decided to call off the watch on December 31.

The reproductive success rate for giant pandas is low even in the wild, where fewer than one-third of the young born are thought to reach 18 months, the age of independence. Problems of pair compatibility and the biological idiosyncrasies of specific animals make captive breeding of pandas an even trickier proposition. "Highly specialized animals, like pandas, are simply much harder to keep in zoos," Kleiman noted. "And, of course, the harder they are to keep, the harder they are to breed."

But like Zoo scientists, disappointed Washingtonians may look to the worldwide panda research picture for encouragement.

"Trying to breed a species in captivity with one pair of animals is kind of like trying to find the Titanic... which they did find, but not without a lot of time, and effort, and expense along the way," said Kleiman. "But international cooperation on pandas is great enough that we have developed a common pool of information and techniques, so it is almost as if we are working with a larger population than we actually have." □



Veteran panda watchers (left to right) Norma Cummings, Nell Ball, and Jo Anne Grumm have been involved in every panda pregnancy watch at the National Zoo.

The Bear Truth

Mark Frankel

Is it a cuddly ball of fluff? A furry friend? A 500-pound pet? As experienced zoo-goers know, animal appearances can be deceiving. Despite its winning looks and playful ways, the polar bear is the most dangerous mammal in the Arctic.

But sentimental bear fans are not alone; even a detached zoologist will agree, there is something mysteriously appealing about the animal family *Ursidae*. "The bear is one of those charismatic species that the public finds so interesting you must include them in a zoological collection or the visitor thinks he hasn't seen a 'real' zoo," said John Seidensticker, whose job as Assistant Curator of Mammals at the National Zoo has provided many opportunities to witness the ways of bears.

Just what that mysterious something is, is hard to say. Dr. Seidensticker is rightly loath to anthropomorphize his charges: Face to face, there is nothing cute or cuddly about a 1,500-pound Kodiak bear, the largest carnivore on the North American continent. Keepers are emphatically warned that all of the five bear species in the National Zoo's collection are dangerous animals. Extreme caution is required at all times when working around them.

Yet, however ferocious or unpredictable, bears also inspire a special affection. You can hear that

combination of awe and tenderness in the voice of Bill Rose, the bears' keeper leader, as he makes his morning rounds. "Hey, Kiska, wake up!" he cries to a groggy Kodiak, as if waking a child late for school.

Members of the family *Ursidae* come in a variety of sizes, from the small, honey-loving sun bear that inhabits the moist, tropical forests of southeast Asia, to the shy, reclusive spectacled bear found in the foothills of the Andes, to the immense and fearsome American grizzly, now sadly threatened with extinction in the continental United States. Despite varying sizes, habitats, and diets, all bears display the distinctive ursine morphology: large bodies, short limbs, and a small tail that looks like it was added as an afterthought. The seven existing species of bear are common descendants of an animal that lived some eight million years ago. Bears are common throughout North America, Europe, and Asia, but only the spectacled bear inhabits South America, and there are no bears in Africa.

Among the most adaptable of large mammals, individual bear species have evolved to take advantage of their diverse environments. "It's incorrect to think that even though they look the same, they are the same," Seidensticker cautions.

Take diet. Black bears and grizzly bears are omnivorous, eating fruits, tubers, flesh—whatever

they can find. Meat-loving polar bears will dine on smaller mammals, birds, eggs, and vegetation, even occasionally raiding garbage dumps when all else fails; but the mainstay of their diet is seal. Their preferred hunting technique is to wait patiently by a hole in the ice cover or at the edge of open water until an unwary seal pokes its head up to breathe.

The sloth bear, on the other hand, is a myrmecophage—a predator of ants and termites that supplements its diet with fruits in season. It has protrusible lips; a mobile snout; nostrils that can be closed voluntarily; and no upper incisors—all adaptations for feeding on insects.

Winter denning is another example of diverse behavior. The black bear and the grizzly belong to the genus *Ursus*. During the winter months when food is scarce, these bears become dormant, a state which may last as long as six months. They do not eat, drink, defecate, or urinate while hibernating, although a sudden mid-winter thaw may tempt a sleepy animal from its slumber for a few days. The animal's metabolism may fall 60 percent or more; heart beats drop from 50-60 to as low as eight per minute. But beware the hibernating bear: It can be easily roused.

Ursine inhabitants of the tropics, such as the sloth and spectacled bears, do not become dormant. Their food supply, while by no means assured, does not

Mark Frankel is a Washington, D.C.-based journalist.



follow the "feast or famine" cycle of the north. The steady food supply available to bears in captivity also eliminates their need to hibernate, but Zoo visitors may notice that black, grizzly, and polar bears are particularly lethargic during the winter months. These bears are responding to their instinct to hibernate.

A wild bear's whole existence revolves around the search for food. Grizzly bears in particular travel great distances to forage and will return to a dependable food source regularly each year, such as a particular salmon stream at spawning time. With strong homing instinct, the grizzly navigates from winter den to summer feeding grounds and back again. One two-year-old male grizzly, captured in Yellowstone National Park after he repeatedly wandered into a campground, was transported 54 miles into the heart of the park so he would not bother visitors again. Four days later, the grizzly was discovered back at the campground.

The bears at the National Zoo don't have to wander far for food, of course. If anything, Seidensticker

believes that the Zoo environment may come close to being too good. "They have a dependable food source, so they do what they would in the wild: They lie around and eat. They probably lie around too much." Whether you're being anthropomorphic or not, bears do seem to enjoy themselves.

This lifestyle seems to suit Zoo bears, which live longer than their wild counterparts. With few natural enemies aside from man, wild specimens still reach little more than 20 years of age. By contrast, "Teddy," a European brown bear, lived more than 30 years at the Zoo before his death last spring; "Mark," one of the Zoo's Kodiak bears, has been on exhibit since 1964; and two of NHP's polar bears came to the Zoo in 1962.

Unfortunately, while bears are commonly exhibited in zoos (there are so many polar bears in zoos around the country that the National Zoo does not breed them because they can't be given away), a number of species are threatened with extinction in the wild. Since 1973, the polar bear has been protected by an international treaty

that bans hunting of polar bears except by people who depend upon them for survival. Nevertheless, the polar bear's future is uncertain in light of the continuing exploration and exploitation of the Arctic by companies searching for energy and mineral resources.

The grizzly bear has suffered too. Once common throughout the western states and as far south as Mexico (Lewis and Clark reported killing 43 grizzlies on their 1804 expedition), it has been almost eradicated from the contiguous 48 states and is now considered a "threatened" species south of Canada. Only the black bear, which is more tolerant of man's presence than its larger cousins, is not endangered.

The National Zoo's two bear breeding programs offer survival insurance to the spectacled and sloth bears. Currently the breeding program for the sloth bear is on hold while the Zoo awaits a new female; but NHP has achieved notable success in breeding the South American spectacled bear, so-called for the rings of light-colored fur surrounding its eyes. Little is known about this forest-dwelling denizen of the Andes, considered the most vegetarian of bears. If, while passing the bear line, you spy a small bear sporting an almost perfect pair of "spectacles," that's Willy, a cub born at the Zoo about two years ago.

It is sad to think that such breeding programs are necessary to stave off extinction, but sadder still is to contemplate a world without bears. □

Bears that normally become dormant in the winter—like the polar bear (left), the black bear ("Smokey," far left), and the Kodiak bear ("Kiska," above left)—do not hibernate at the Zoo because they have a regular food supply. Tropical bears—like the spectacled bear ("Willie," overleaf)—never hibernate (overleaf photo by James Lynch).



Milton Tierney





A Quoll by Any Other Name

Larry Collins and Kevin Conway

Human nature typically roots new discoveries in old experience. We boldly set out for brave new worlds, but long to arrive on familiar shores; hence the names "New" York, "New" England, "New" South Wales, and so on. Often the animals of alien lands were similarly labeled by pioneers, who summoned distant memories of home through the magical, if sometimes misleading, power of a name.

The first European explorers of Australia crossed paths with mammals that seemed reassuringly reminiscent of animals found back home. It thus follows that we have koala "bears," Tasmanian "wolves," and marsupial "mice," "rats," and even "moles."

Perhaps the most oddly named Australasian marsupial was the tiger cat, first reported in 1770. This animal, one of five Australasian species of quolls, or "native cats," is neither tiger nor cat. It doesn't even boast a single stripe. (More recently the name "tiger quoll" has come into vogue, quoll being a spurious derivative of the beast's aboriginal name, "jaquol.") Indeed, how the word tiger ever came to be applied to a strikingly spotted animal remains one of the Animal Kingdom's mysteries. Perhaps the name alludes to the beast's deadly midnight stalks through the chicken coop; then

again, it may have been inspired by the quoll's occasional aggressive scream, an ear-splitting noise best compared to the blast of a circular saw.

Stella the Extrovert

In January 1984, two pairs of Tasmanian-born tiger quolls were brought to the National Zoo's Conservation and Research Center in hopes of breeding the species for the first time outside its native land. As soon as the four animals arrived, we noticed that the smaller female, "Stella," was a real extrovert as tiger quolls go. While her three companions typically shied away from people, Stella would walk right up and check us out, untying our bootlaces, if she took the notion. Always eager to be fed, she was willing to let keepers remain in the enclosure with her even after a meal had been delivered and devoured.

The four quolls quickly settled into spacious new quarters, which were decorated with soil-like substrate, plants, rocks, and hollow logs—in short, all the comforts of the quolls' rainforest home.

The new arrivals were subject to a rather extreme form of jet lag: Tiger quolls breed during the short days of Australia's winter—our summer—and we hoped that their biological clocks would adjust to the topsy-turvy Northern hemisphere. In the fall we began staging encounters between the two females, Stella and Melbourne, and their respective intendeds,

Angus and Sydney. The romantic preludes were sometimes punctuated with hair-raising screams, but when we realized that the animals were not going to hurt each other, we allowed them to cohabit adjacent enclosures.

Stella and Angus mated on the first of December, and the protracted copulations characteristic of dasyurid marsupials continued for the next four days. Finally Angus' interest waned, and he was retired to his flat next door. The recorded gestation period for tiger quolls is 21 days, so several weeks later, Stella was caught and examined to determine if indeed a blessed event had occurred. Her empty pouch led to profound disappointment all around. Meanwhile, the second pair of animals had not shown much interest in each other, and bright hopes for tiger quoll joeys began to dim.

Tiger quoll females have been known to cycle into estrus twice during the breeding season, so Angus was once again summoned out of celibacy. The pair renewed their relationship amicably enough, and on the last day of January, Stella and Angus embarked on another four-day mating marathon.

Shortly thereafter, Stella began a period of nest-building activity. Near the end of February, she developed a most wicked attitude toward her former mate and would scream whenever he approached. Angus was returned to his bachelor quarters, and Stella intensified her nest-building

Larry Collins and Kevin Conway conduct their research at the Zoo's Conservation and Research Center in Front Royal, Virginia.

efforts. Eager to help things along, we placed a large, straw-filled nest box against the wall in her enclosure—the grateful animal at once proceeded to excavate a large nest chamber *beneath* it!

Stella's diet was increased as a precautionary measure: We didn't want a hungry, carnivorous mother on our hands, since plump joeys in the pouch might be too tempting a snack. Following a regimen of minimal exercise and abundant food, Stella waxed fat, with porcine jowls and new "love handles." Once she could definitely pinch-an-inch, we cut back her diet slightly, knowing that after the young were raised intact, we could place her on a strict diet of foods such as crickets that would require active hunting. Meanwhile, the waiting game continued.

Restrained Jubilation

On the second of April, keeper Tom Schneider spotted a joey in Stella's pouch; a second joey was observed three days later. We restrained our jubilation, determined to ensure that the mother quoll was given every opportunity to rear her fragile joeys. Privacy was strictly enforced, and Stella began spending most of her time in the underground den, emerging only long enough to eat, groom, and take care of other necessities.

Occasionally she would lie with her head just inside the entrance hole, her moist pink nose bobbing up and down as she followed goings-on in the outside world.

Toward the end of the month, Stella was seen sleeping on her side in a straw nest near the front of her enclosure. The joeys, then visible, were pink with white spots. The following week a fine fur pelage began to develop.

The joeys grew rapidly and were soon spending time out of the nest box. Scouting expeditions and arboreal antics became the order



Stella's joeys proved to be as inquisitive as their mother.



Now and then, when the young quolls explored their enclosure, Stella would cluck a soft "round-up" call.



A tiger quoll joey takes a brief rest amid the remains of a plant she just demolished.

Larry Collins

Larry Collins

Larry Collins

of the day, not without damage to a few hanging plants. Wrestling, stalking, and play-fighting followed, with the joeys tormenting their exhausted mother. A popular activity involved the two joeys racing around the enclosure, building up speed, and simultane-

ously leaping upon Stella. Occasionally, a scolding hiss would remind the young of their place in the natural order of things.

Stella had a few games of her own that taught her offspring some valuable lessons in survival. Waiting until the joeys had

strayed too far, she would stalk them with great stealth until they dashed for the den entrance. A stern teacher, Stella never failed to intercept her young and pin them to the ground with her powerful forepaws. Certainly, a far worse fate might befall wild joeys that wandered too far.

Bold with People

As the joeys grew larger, Stella allowed them to explore at will, now and then clucking a soft "round-up call." By 15 weeks of age, the youngsters were catching and eating crickets, digging under rocks, waterbowls, and nests to find their tasty prey. The joeys became inquisitive and, like their mother, bold with people, tugging shoelaces and investigating equipment. Tops of socks were favorite targets, and at times only the deft manipulation of one's foot prevented the young predators from sampling human flesh.

Between three and five months of age, the joeys frequently struck out on their own. Stella seemed perfectly content with this turn of events: She now had much more time for sleep! During this period, we created a pool in the enclosure, much to the apparent delight of Stella and the joeys. Eventually, they perfected the technique of walking slowly through the water so that only their legs and stomach would get wet.

The young quolls were fully weaned and almost independent by late summer. Both could be identified by their distinctive spot patterns, and, upon their first physical exam in late August, we were pleasantly surprised to discover that both youngsters are female. Already anticipating their adolescence, we plan to recruit two young males to be paired with "Alice" and "Adelaide" in NZP's slowly increasing tiger quoll collection. □



Joan Bopst

The Baffling Marsupial

When Old World naturalists took a closer look at the "tiger cat" and other Australian marsupials, they were baffled by the creatures' characteristic pouches. They deduced that this diverse range of Australian mammals (an apparent dynasty of females since their pouchless male counterparts were identified as other species) must somehow be related to the exotic New World opossum, a species familiar to Europeans since 1500, when the Spanish explorer Vincente Yanez Pinzon presented a pouch-gravid female Brazilian opossum to

Queen Isabella and King Ferdinand of Spain. This "incredible mother," as the Queen described Ms. Opossum, aroused such curiosity in Her Majesty that she proceeded to poke her royal fingers into the swollen pouch—an incident irreverently referred to as "The Royal Intrusion of 1500" and "the first European research project carried out on a New World carnivorous marsupial."

Almost five centuries later, researchers still have much to learn about marsupials, so NZP's tiger quoll study is breaking new zoological ground.

Going Bats

Susan Lumpkin

Twice a year the silence of the National Zoo's Lion-Tiger House is shattered by the staccato sound of hammers striking metal.

"Why can't they work after visiting hours?" I asked the first time I heard this awful din.

But I was fooled. There was no behind-the-scenes construction. The metallic melody came from a male hammer-headed bat, doing his best to attract a mate.

The sight of any bat is enough to send shivers down superstitious spines; but hammer-headed bats are so bizarre that you can only stare, almost afraid to look away. And while you might finally avert your gaze, you won't be able to turn a deaf ear to these nocturnal singers.

The largest African bat species, hammer-heads are big as bats go—but males make noise out of all proportion to their size. At about 450 grams, males are almost twice the size of females; yet more than half the male's body cavity is filled with just one organ—the larynx or voice box. It allows male hammer-heads to produce an extraordinarily loud mating call, which is further amplified by inflatable cheek pouches, flaring nostrils, and a funnel-shaped mouth—facial features that only a female bat could love.

The call of one male is loud...

Dr. Lumpkin, an NZP Research Associate, is currently preparing a book on the management of wild animals in captivity.



Milton Tenney

The male hammer-headed bat is about 12 inches long and almost twice as heavy as the female.

very loud. Imagine, then, the din of 100 or so males, hanging about 10 meters apart in a cluster, all chorusing at once. In the rain-forests of west Africa, that's what you would hear every night, from 6:30 to 11:00 and again from 3:00 to 5:00 a.m., during the bat's semi-annual breeding season. Each breeding season lasts from two to three months, so for almost half of the year's nights, you might be serenaded by the males' come-hither song. Just the thought of it is enough to keep you up nights.

At the Zoo, two adult male hammer-heads vie for the attentions of seven females. Each September and March, the abrupt

onset of raucous, repetitive calling heralds the beginning of the breeding season. Frequently it follows the birth of a baby, for female hammer-heads come into estrus right after giving birth and often mate while carrying their newborn young.

Rarest Mating System

In the wild, nocturnal assemblies of males are called mating arenas or "leks." Scientists define leks as "aggregations of displaying males to which females come only to mate." Only two other species of mammals—antelopes called topi and Uganda kob—are known to form leks. A few species of birds,

frogs, fish, and insects also form leks, but lek mating is the rarest of all mating systems.

The location of a lek never changes: Bats have sung from the same sites, usually along waterways, for as long as anyone can remember. During the breeding season, male hammer-heads defend small territories on the lek. But unlike most mammals and birds, the male hammer-heads do not eat or sleep in their territory; the sole function of the territory is to provide a place for males to attract females for mating.

Both males and females spend their days sleeping in roosts that may be miles from the lek. At dusk, males fly off to the lek, not even stopping to eat on the way. They soon begin their display, calling up to four times a second while feverishly flapping their wings. Soon females begin filtering into the lek. A female subjects several males to close scrutiny before finally selecting a mate. As she looks them over, the males tuck their wings close to their bodies and perform a special buzzing call. Once the female decides, no time is wasted: She lands next to the male, mates within 20 or 30 seconds, and departs with a squeal.

No one knows why a female selects one male over another, but female hammer-heads seem in remarkable agreement about what they like! In one study, 40 of 50 females selected the same five mates out of a choice of 85 males displaying on the lek. Males only live through three or four breeding seasons, so most probably never get to mate at all. Females, on the other hand, regularly mate and produce a baby every six months for years. Clearly, females are the winners in the biological battle of the sexes among hammer-headed bats. □



Milton Tierney

Female hammer-heads produce a single infant every six months.

Keeping Up With Keepers

Kathleen Walsh

If Noah were alive today, he might be out of a job. Qualifying to be an animal keeper just isn't as easy as it used to be. Now that U.S. zoos have evolved from menageries into modern arks of conservation and research, the role of U.S. zoo keepers has evolved as well. Once considered unskilled animal custodians, today these individuals are respected as experienced technicians.

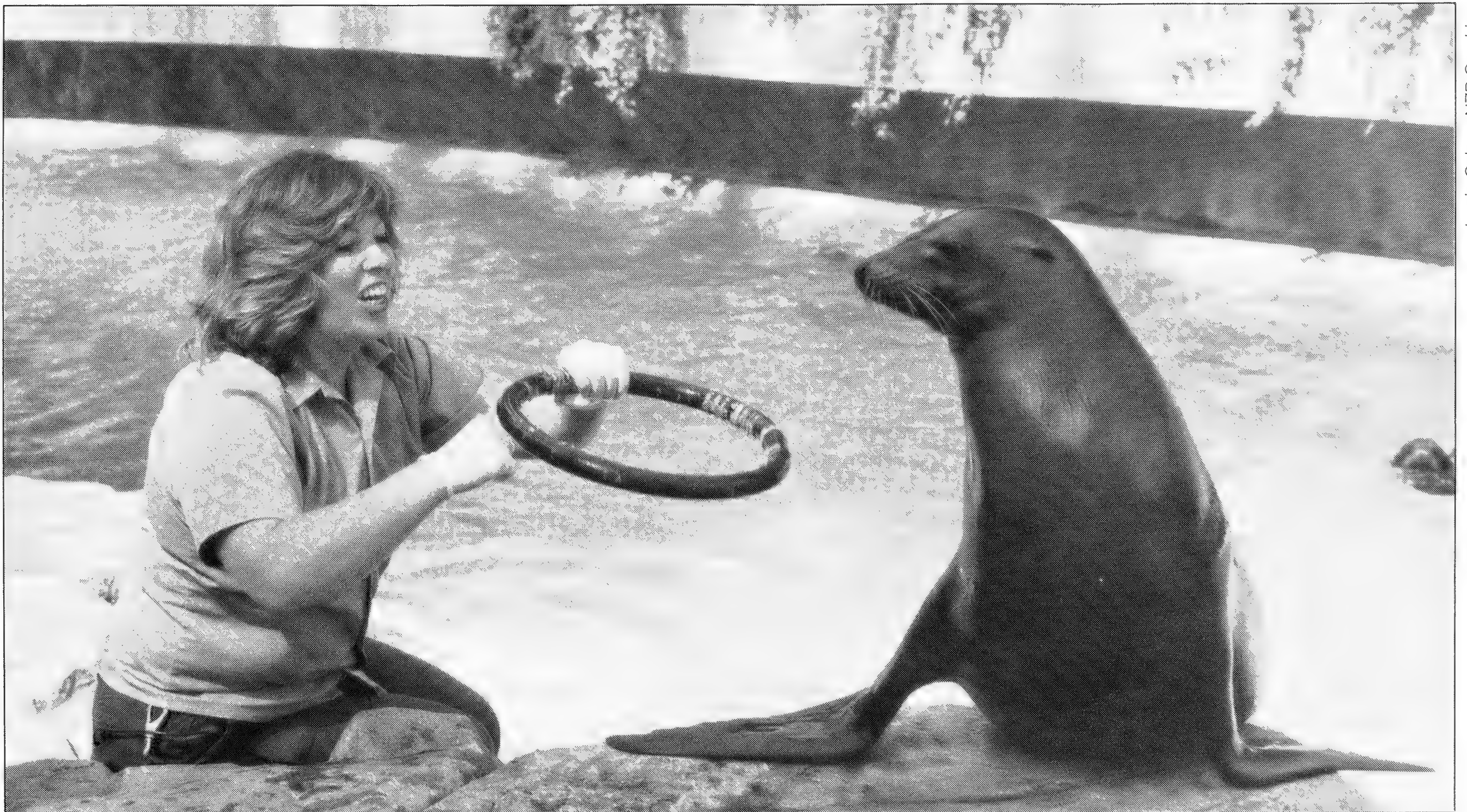
Gone are the days when any animal lover could walk into a zoo and be hired. Aspiring keepers now find themselves up against demanding experience require-

ments and extremely stiff competition. Many zoos prefer keepers to have a college degree in zoology or biology. "But the key is experience," according to Mike Johnson, a former personnel specialist at the National Zoo. NZP prefers applicants who have at least one year of experience in exotic or specialized animal husbandry, such as working with cattle or horses. "We try to find people with specific skills," Johnson said. An applicant with specialized experience *and* a degree is an ideal candidate for a keeper position.

NZP keepers have gained their

experience in a variety of ways. Kayce Cover, a seal and sea lion keeper-leader, trained whales and dolphins before she came to the National Zoo. This experience helped her design training programs for the animals she works with here. Vince Rico bred and trained horses before he became a keeper in Beaver Valley, transferring his husbandry expertise from creatures great to small. Other NZP keepers have had specialized experience ranging from laboratory work with primates to reptile breeding as a hobby.

Applicants with only general



Kayce Cover brings the confidence of experience to training sessions with the National Zoo's sea lions.

Jessie Cohen, NZP Graphics



animal experience have a tough time competing. Zoo Historian Billie Hamlet tells the story of her friend Leszek Solski, a Polish veterinary surgeon who is trying desperately to get a job as a keeper in the United States. "His chances are not good, even with his qualifications," she said. "There are many more applicants than there are vacancies." At the National Zoo, for example, approximately 200 people apply each year for an average of six to eight keeper openings.

Those who do get hired have a diversity of responsibilities. Now that many zoos incorporate natural habitat designs, the demands on keeper staffs have grown. Maintenance of man-made deserts, forests, and aquatic environments calls for a variety of skills, from cultivating the cacti that house elf owls to keeping the "ocean" cool enough for polar bears.

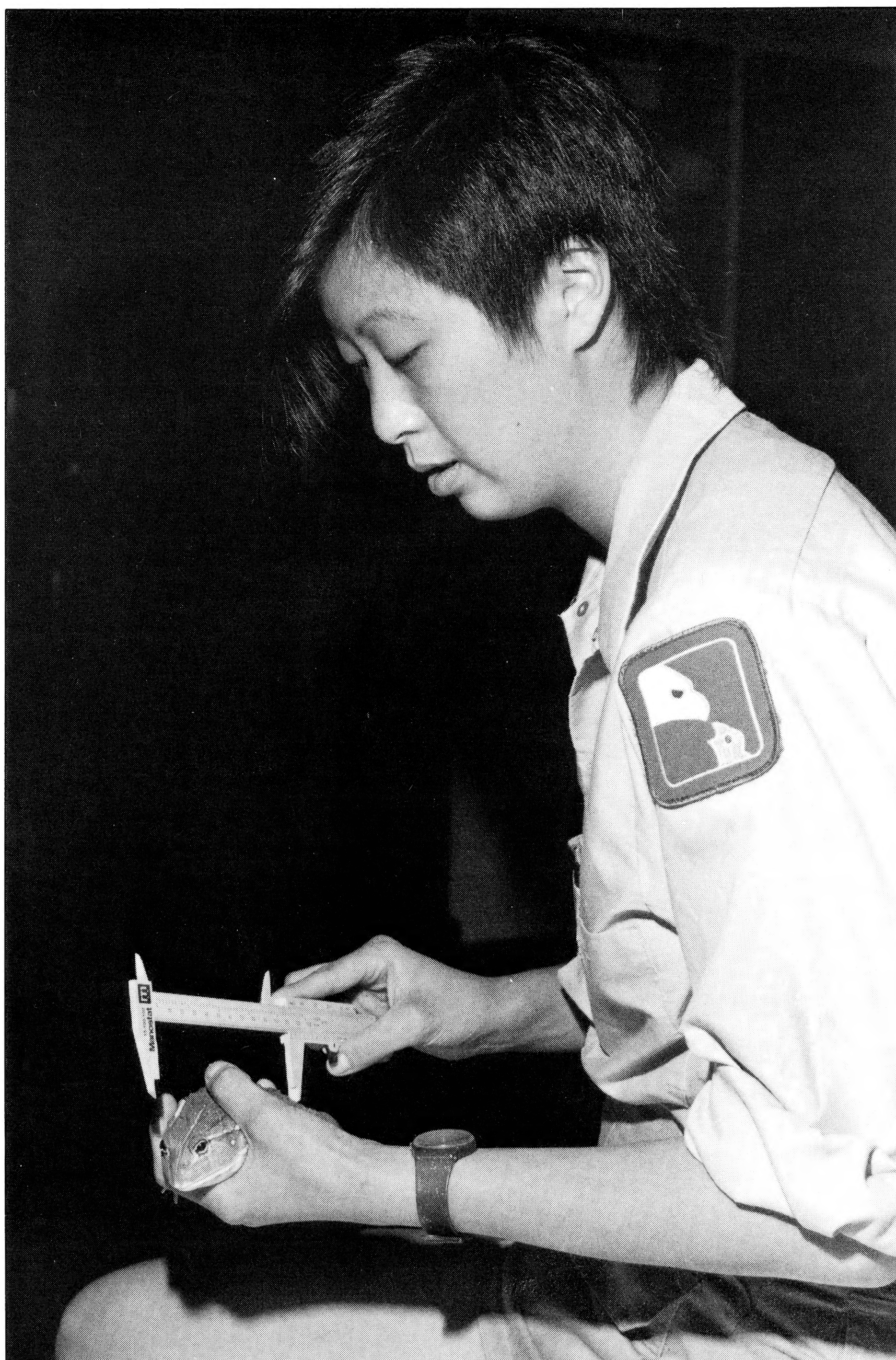
In addition to performing their important basic duties of maintaining enclosures, feeding animals, and keeping records on their behavior, keepers often design exhibits, participate in public education programs, and conduct research. Keepers also perform an important public relations function. Since they are frequently the most visible zoo employees, they must be ready to respond when asked what ostriches eat, why elephants put dirt on their backs, or other such questions from zoo visitors. To keep up with the latest zoological information, many keepers regularly read a wide range of published literature relating to animals and zoos.

In response to changes in the role of animal keepers, the Ameri-

can Association of Zoo Keepers (AAZK) was formed in 1967. Today it boasts over 30 active chapters in North America and a worldwide membership of approximately 1,700. One of AAZK's most important functions is to promote communication among its members, mainly through its monthly publication *Animal Keeper's Forum*. AAZK also pro-

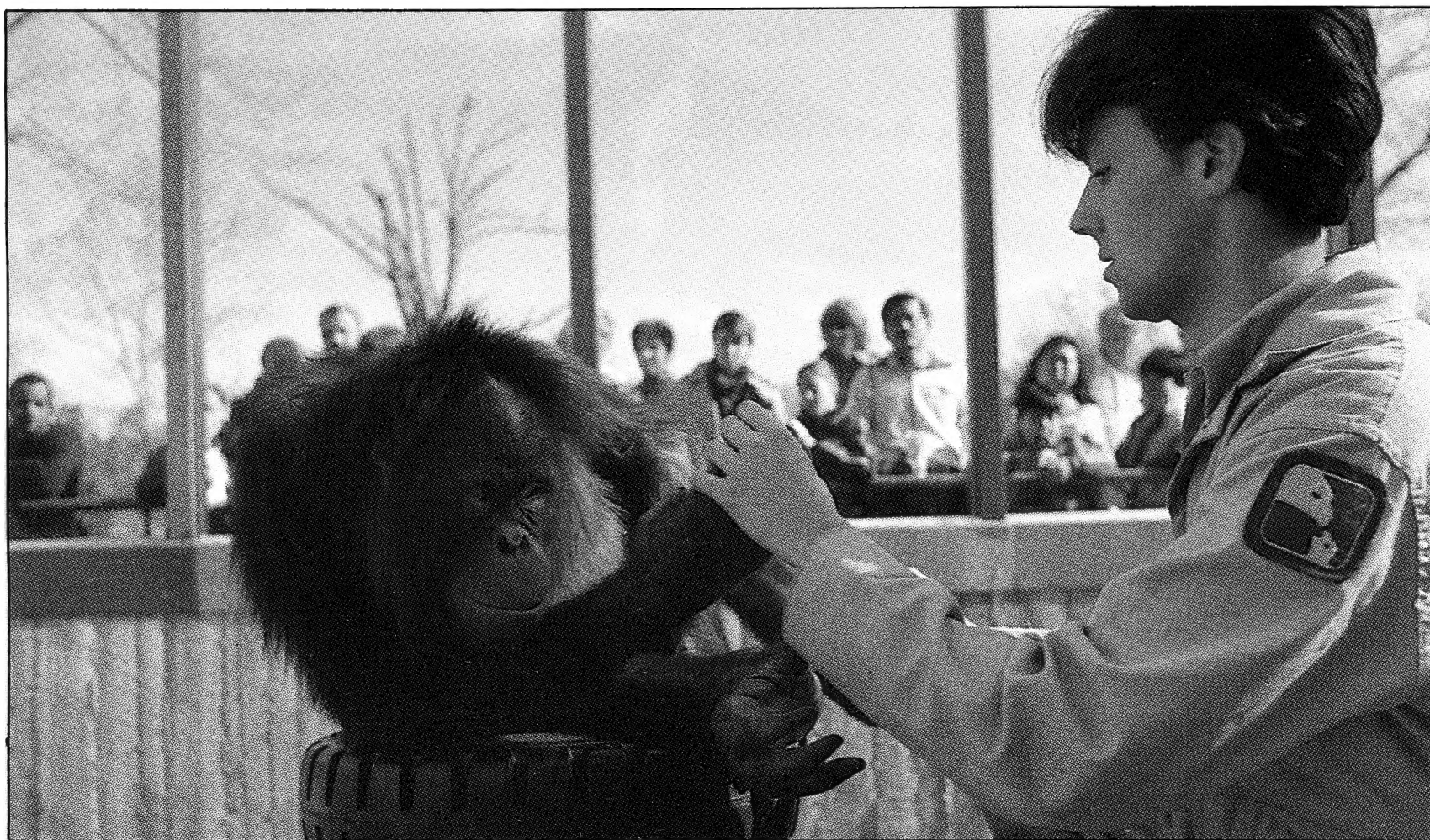
vides a network of contacts, through which keepers can exchange information such as handling tips, medical problems, or training techniques. Says NZP primate keeper Melanie Bond, "It's a never ending challenge to keep primates intellectually stimulated, so ideas from other keepers are very valuable."

AAZK also keeps its members



Left: Kathy Wallace gives a cooling bath to a muddy Asian elephant. Right: Cecilia Chang measures a young African bullfrog to see how much it has grown.

Jessie Cohen, NZP Graphics



intellectually stimulated; for example, the association produces educational videotapes dealing with subjects such as keeper safety—an important topic when a workday might involve teeth, claws, or talons.

Several NZP employees belong to AAZK, and some hold national offices. Kevin Conway, a small mammal keeper-leader at the Zoo's Conservation and Research Center in Front Royal, Virginia, is AAZK's former president, while Angela Keppel, a small mammal keeper in the Zoo's Department of Zoological Research, has served as AAZK's regional coordinator for Virginia and West Virginia. Frank Kohn, a biotechnician in NZP's Research Department, is AAZK's vice president. He hopes keepers, who accumulate valuable information in their daily work with animals, will become increasingly involved in research projects. "One of my goals," he said, "is to get scientists and keepers working together so they can exchange information and learn from each other."

Learning is a continual process in zoo keeping, as in many other fields. Sometimes keepers move into management jobs, using what they've learned as a basis for administrative decisions. "Many zoo directors today started out as keepers," Conway said.

More often, however, zoo keeping is a lifelong career. With such keen job competition, the keepers hired are those most deeply committed to their work—modern-day Noahs, helping to keep the ark on a steady course. □

(For more information on AAZK, call Frank Kohn or Angela Keppel at 202/673-4753.)

Left: Lisa Stevens feeds an eager otter. Above: Rob Shumaker coaches an orangutan that is learning sign language.

Years Ago . . .

A Little Bird Told Him

Kathleen Walsh

Of all the lobbyists in Washington history, the most unlikely was a small black resident of the National Zoo—a Javanese mynah that helped NZP to feather its nest.

The bird came to the Zoo in 1926 as a gift from Dr. H. C. Kellers, who brought the mynah back from a Naval expedition to Indonesia. Zoo officials were pleased to discover that the bird could already speak a few phrases, but they would soon see that he was no mere "Polly-want-a-cracker" type of conversationalist.

At the time of the mynah's arrival, the Zoo's budget didn't amount to a pile of bird seed. Consequently, many of its buildings were very old and unfit for the valuable animals they held. The Bird House, built as a temporary shelter in 1898, was terribly overcrowded. Its feathered occupants were squeezed into every nook and cranny that could be improvised for them; two black swans and several other birds had to be caged outside in a closed parking lot. Of necessity, the mynah resided in a building behind the Monkey House—emergency housing that he shared with lions, lemurs, and porcupines. An appropriation for a new Bird House was before Congress, and Zoo officials could do nothing but cross their fingers and wait.

As it turned out, maybe they should have crossed their toes as well. Although the appropriation eventually came through, it didn't

include any money for enclosures. Those were to be provided for in a second appropriation, so Zoo officials found themselves waiting once again.

Financial troubles also plagued the Smithsonian's other branches, and the Institution faced an uncertain future. So one chilly day in 1927, President Coolidge, Vice President Dawes, the entire cabinet, and 50 scientific, industrial, and political leaders met at the old Smithsonian building to discuss the situation. Each branch of the institution had a booth set up, and one of the exhibits in the Zoo booth was the Javanese mynah.

After a morning of speeches, the company dispersed to view the various exhibits. Strolling through the hall, Director of the Budget Gen. H. M. Lord came upon a fascinating collection of reptiles . . . preserved in alcohol. As he leaned forward to peer more intently at the specimens, his concentration was suddenly shattered.

"How about the appropriation?" an irritated voice demanded.

Turning quickly in the direction of the voice, Lord discovered the Javanese mynah eyeing him from a nearby cage.

"Who educated that bird?" the

general asked, but the mynah ignored this attempt to change the subject.

"How about the appropriation?" he repeated impatiently.

Many people were chuckling, but Lord was a rather dour character, and his feathers were considerably ruffled by this rude outburst. "That is impertinent," he declared.

"So's your old man!" the mynah shot back.

Even the general had to laugh then.

The next day *The Evening Star* described the mynah-to-man confrontation, adding: "Zoo officials are unable to explain (for publication) how he got the idea into his head. They deny indignantly (for publication) that he has been trained for any such role." Indeed, Zoo Director William Mann insisted that he was "mortified beyond words" at the mynah's behavior.

But rude or not, perhaps the mynah's lobbying effort paid off. A few months later, Congress added \$30,000 to its appropriation for a new Bird House. Even so, no one ever admitted (for publication) to having been responsible for what happened that February 11—the day a little bird at the Smithsonian caused a mynah flurry. □





Often endangered in the wild,
many bear species flourish in zoos (p. 9).

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